Inventor's Life Devoted to Perfecting His Uses of Radio Waves

MARCONI PIONEER IN RADIO'S ADVANCE

Began Work at 19 and Sent First Wireless Flash in His Home in Italy in 1895

YACHT WAS LABORATORY

His Last Years Were Devoted to Short and Micro-Waves—Received Many Honors

Guglielmo Marconi's life was marked by four great climaxes: First, the first flash of the wireless spark across the garden of his home in Bologna in 1895; second, the first transatlantic signal in December, 1901; third, the S O S and the heroic rôle played by wireless in the Titanic disaster in 1912; fourth, development of short waves, the vacuum tube and radiophone during the World War.

Never did he cease to pursue and to delve into the secrets of the invisible waves after he heard their first feeble sputter. The transatlantic signal opened the eyes of the world to the international possibilities of his invention.

It was the simple letter "S" in the Morse code that, flashed across the Atlantic from Poldhu to Newfoundland, won the faith of scientists in Marconi. The layman, however, remained skeptical and most of the world scoffed at the idea of sending messages through the air across the ocean.

Despite the rapid progress in transatlantic wireless between 1901 and 1912, with stations at Cape Cod, Mass.; Glace Bay, N. S., and Clifden, Ireland, there were many who still doubted the utility of wireless. The Titanic tragedy and the frantic calls for help from mid-ocean removed all such thoughts and Marconi became the hero of the hour, a benefactor of mankind. All the world after that disaster was as proud of Marconi as he was of his wireless. Marconi was credited with an immortal accomplishment.

Short Wave Work Delayed

The urgency of long distance and secret communication during the World War sent Marconi scurrying back to follow an idea beheld in the Nineties when first experimenting. Short waves and directional reflectors entranced him in the beginning, but he was forced to put them aside, because with the apparatus and the power then available, longer waves traveled farther. Nevertheless, he never lost faith in the short waves. To him they were a rainbow of hope for the future of radio and for television.

Guglielmo Marconi was born in Bologna, Italy, on April 25, 1874. His father was Giuseppe Marconi, a wealthy Italian business man. His mother was Anna Jameson, daughter of Andrew Jameson of Daphne Castle and Fairfield, Enniscorthy, County Wexford, Ireland. Her father was a member of the Jameson family of whisky distillers in Dublin. On her mother's side she was connected with the Haig family in Scotland. She went to Bologna to study music and fell in love with Giuseppe Marconi, whom she married in 1864 after the death of his first wife.

Alfonso Marconi, another son of Giuseppe Marconi and Anna Jameson, died in London last year of a heart attack, the malady that killed the inventor.

From his father, besides riches, Marconi inherited good business sense, an indomitable will, and an inventive turn of mind. His mother gave him initiative, vision and an interest in the arts, especially music. He played the piano throughout his life. She also gave him his blue, penetrating eyes and his calm outlook.

He spent his boyhood at his father's home in Bologna and his country estate near by, with Winter trips to Florence and Leghorn. He received most of his education from tutors. He attended an institute at Florence, but never entered a university.

The inventor was only a child when he became intensely interested in electricity. He read everything he could find on the subject, and Thomas A. Edison became his hero. In later life, on his frequent visits to the United States, he and Mr. Edison became close friends.

It was on a vacation in the Italian Alps, at the age of 19, that the germ of the wireless idea was born in Marconi's mind. Reading in an electrical journal how the scientist Hertz, who had recently died, had radiated electromagnetic waves with an electric oscillator, and how sparks appeared in a metal loop across the room, he asked himself why these Hertzian waves could not be developed to leap across larger spaces.

"It seemed to me," he explained in a lecture years afterward, "that if the radiation could be increased, developed and controlled, it would be possible to signal across space for considerable distances. From the first the idea was so real to me that I did not realize that to others the theory might appear quite fantastic."

He spent the Summer letting his imagination run riot with the idea. When he returned home that Autumn, he began experiments in his third-floor workshop with his brother Alfonso and the household servants as laboratory assistants. These tests were the birth of wireless. In a few weeks the youthful inventor was able to ring a bell on the ground floor by pressing a button on the third floor, without any connecting wires. Then he transmitted signals from one part of the house to another, finally from the house to the lawn.

His father, skeptical, proposed a test. He would believe in it if his son could transmit the three dots of the letter S in Morse code from the transmitter in the house to the receiver on the lawn. Listening at the receiver, the father heard the three clicks which meant success.

With $1,000 which his father advanced, Marconi developed his apparatus for more ambitious experiments, and soon succeeded in transmitting Morse dots and dashes from his radio room over considerable distances to the hills and fields on his father's estate.

Explained His Successes

The inventor explained his successes as due to "experiments with machines invented by other men to which I applied certain improvements."

"I used the Hertz radiator and the Branley coherer," he said. "The radiator was what would be known in telegraphers' speech as the sender and the coherer the receiver. The improvements which I made were to connect both receiver and sender with the earth and, second, the vertical wire insulated from the earth. The latter was by all means the most important of the two innovations. At once instead of being limited to a few yards in results, I extended the distance over which a message could be sent without wires to about two miles."

Marconi applied for his first patent in 1896. He had beaten many distinguished scientists, including Sir Oliver Lodge and Sir William Preece of England and Professor Augusto Righi of Italy, in the race to apply the scientific discoveries of Maxwell and Hertz to the problem of communication without wires.

He offered his invention to the Italian Government, but it was rejected with the suggestion that wireless seemed to promise most usefulness on the sea and that he go to England, the great sea power. He began new experiments in London with a cousin, Jameson Davis, an engineer, with aid from the British Postoffice.

Called back to Italy for military service at this time, Marconi faced the prospect of giving up his experiments for three years. He appealed to the Italian Ambassador, who interceded and won him permission to remain in England with the status of a naval student in training, and to continue his experiments under the auspices of the Italian Embassy.

His English tests were so successful in signaling over longer and longer distances, as he raised his sending and receiving instruments higher from the ground and used more and more power in sending, that the Wireless Telegraph and Signal Company, Ltd., was incorporated in 1897, the first commercial organization of its kind. Three years later its name was changed to Marconi's Wireless Telegraph Company, Ltd. Its chief purpose was to install wireless on lightships and lighthouses along the English coast.

News Sent From Ship

In 1898 Marconi showed what wireless would some day mean in the transmission of news by establishing a mobile radio station on a steamer, from which reports of yacht races off the Irish coast were flashed to The Daily Express of Dublin.

At the request of Queen Victoria, Marconi established radio communication between Osborne House on the Isle of Wight, where she was staying, and the royal yacht Osborne with the Prince of Wales aboard in Cowes Bay so she could receive reports of his injured knee.

Marconi returned to Italy in 1898 at the request of his government to continue his experiments at the Spezia naval arsenal. The next year, at the request of the French Government, he made what was up to that time his most pretentious experiment, the sending of a wireless signal across the English Channel from Wimereux, near Boulogne, to the Dover Cliffs, a distance of thirty-two miles. This also was a success, and messages were sent back and forth at the rate of fifteen words a minute.

Late the same year the inventor came to America on his first visit to transmit the news of the America Cup yacht races at the invitation of James Gordon Bennett, owner of The New York Herald. Carrier pigeons had previously been used. With the sender installed on a steamer and the receiving mast erected at Navesink, N. J., from which the news was telegraphed to New York, the demonstration was a success. In sixty seconds The Herald office knew what was happening off the New Jersey coast.

The United States Navy became interested and installed wireless on the battleship Massachusetts and the cruiser New York. Signals were exchanged up to thirty-six miles. English warships sent messages back and forth for seventy-five miles. Many persons on both sides of the Atlantic believed that the curvature of earth set up a barrier which would prevent the transmission of signals for much greater distances.

Against this background Marconi had his great dream of sending wireless messages across the 2,000 miles of the Atlantic Ocean. The inventor selected Poldhu, near Mullion in Cornwall, on the barren southwest tip of England, as the site for his sending station in the first transatlantic test. A transmitter 100 times more powerful than any previous station was erected. Then he sailed for America with two assistants and put up his receiving apparatus on Signal Hill at St. John's, Nfld.

Receives Signal Across Sea

Before leaving England Marconi had given instructions that the the three-dot signal for S in the Morse code be transmitted at a fixed time each day as soon as he sent word that the St. John's station was ready. On Dec. 12, 1901, Marconi waited at St. John's with his ear to a telephone receiver, connected to a self-recording wireless receiver.

This was the crucial test. Marconi waited a long time. With him was George S. Kemp, an assistant.

"Suddenly, at about 12:30 o'clock," Marconi reported later, "unmistakably three scant little clicks in the telephone receiver, corresponding to three dots in the Morse code, sounded several times in my ear as I listened intently. But I would not be satisfied without corroboration.

"'Can you hear anything, Kemp?' I said, handing the receiver to him.

"Kemp heard the same thing I did and I knew then that I had been absolutely right in my anticipation. Electric waves which were being sent out from Poldhu had traversed the Atlantic serenely, ignoring the curvature of the earth, which so many doubters considered would be a fatal obstacle. I knew then that the day on which I should be able to send full messages without wires or cables across the Atlantic was not very far away. Distance had been overcome and further development of the sending and receiving instruments was all that was required."

When Marconi announced this success, which created an international sensation, he disclosed that the demonstration had cost $200,000.

Marconi was now a world hero, congratulated by scientists, officials and newspapers. Perhaps nothing carried the implications of his work to the average man more than the lawsuit against him by the Anglo-American Telegraph Company, which claimed a monopoly within Newfoundland. This and other hostile actions by the cable companies strengthened Marconi's belief in the commercial future of wireless. He announced plans to erect stations for the regular transmission of transatlantic messages.

In 1902 Marconi made a trip from England to the United States on the steamship Philadelphia. He carried with him a receiving set equipped with an automatic device which recorded all the way across the Atlantic wireless messages sent from the Cornwall station.

The same year he sent the first west-east wireless message across the Atlantic from Glace Bay, N. S., to Cornwall. In January, 1903, he opened a station at South Wellfleet, on Cape Cod, which began two-way communication with messages exchanged by President Theodore Roosevelt and King Edward VII.

Rapid technical advances were made during the next few years, with many inventions by Marconi and others, including John Ambrose Fleming, an Englishman, whose valve detector was the forerunner of the vacuum tube, and Lee De Forest, an American, who added the grid. Marconi worked to perfect his "tuning" system so that a receiving station could listen in to a particular transmitter, tuning out all others. More and more transmitters were built, and more and more ships at sea were equipped with wireless.

Oct. 15, 1907, was a historic date, for it marked the beginning of a regular commercial and press service by wireless between the Old World and the New, between Clifden, Ireland, and Glace Bay. Land telegraph was used to relay messages from those stations. As told in more detail elsewhere in this issue, THE NEW YORK TIMES played an active rôle in the development of this service. Gradually Marconigrams, as radio messages were first called, began to be popular for transatlantic as well as ship-to-ship and ship-to-shore communication.

From its earliest days wireless had been useful in preventing disaster and aiding rescues of ships at sea. But the collision of the liners Republic and Florida, in which Jack Binns, the radio operator, became famous for his S O S in 1909, and the sinking of the Titanic in 1912 dramatized the humanitarian value of the radio at sea before the eyes of the world. How the radio has saved many lives in these and other disasters is told in another column.

During the same period huge transmitting masts were erected in various countries on both sides of the Atlantic, and radio broadcasting of the human voice as known today had its beginnings in de Forest's advances on Marconi's original idea. On Jan. 13, 1910, Enrico Caruso and other opera stars broadcast from the stage of the Metropolitan and were heard on land and sea.

Marconi lost his right eye in 1912 as the result of an accident in which an automobile he was driving from Spezia to Genoa collided with another car.

From 1905 to 1914 Marconi was confronted with numerous patent suits and other legal actions, especially in England, Germany and the United States, in which his claims as the father of wireless were challenged by other inventors. He readily admitted that he had used the discoveries and inventions of prior scientists, but pointed out that no one had succeeded in sending actual signals and messages over appreciable distances without wires until he did so.

The interests of the Marconi companies in the United States and other countries were threatened by these suits until in 1914 Judge Van Vechten Veeder in the United States District Court in Brooklyn handed down a decision holding that all the patents filed in this country by Marconi and his associates were valid.

"I find," said the judge," that the evidence establishes Marconi's claim that he was the first to discover and use any practical means for effective telegraphic transmission and intelligible reception of signals produced by artificially formed Hertz oscillations."

Marconi returned to Italy after the outbreak of the World War. When Italy entered the war he became a lieutenant in the Italian Army. Later he was transferred to the navy with the rank of commander.

He directed a large staff of Italian experts in adapting wireless to warfare. Returning to boyhood experiments he had abandoned in the perfection of commercial wireless, he developed short-wave transmission as a secret means of communication.

He worked out a system of narrow-casting, using parabolic mirrors to converge the waves in a beam, to save power and prevent messages from being diffused or broadcast into the enemy camp. He evolved new direction finders to spot enemy sending stations and to enable Italian ships to get radio bearings from shore stations. He served on war missions to the United States and England. After the armistice he participated in the peace conferences with Austria and Bulgaria.

Yacht Becomes Laboratory

Out of the war and the accompanying research by thousands of other scientists and inventors radio grew tremendously in power and scope, with great forward strides in wireless telephony, the vacuum tube and short waves. Marconi purchased a yacht, named it the Elettra, fitted it out for wireless experiments and used it as a floating laboratory.

Marconi received a series of ovations when he came to this country in the Elettra in 1922 on one of his more than eighty trips across the Atlantic. In 1924 he was able to guarantee a high-speed beam system of wireless communication to all parts of the British Empire. When transatlantic radio telephone service was opened between New York and London in 1927 it was recalled that Marconi had predicted it in 1915.

The last years of his life he spent in experiments with short waves and the tiny micro-waves, which he regarded as holding the secret of the radio of the future and of television.

The inventor was a strong adherent of Premier Mussolini and fascism in Italy. Mussolini made him president of the National Council of Research and of the Royal Academy. He had charge of all Italian scientific research, and shortly before the Ethiopian war he was said to have worked out an invention of great military value. Its nature was kept secret, but in some quarters it was said to be an application of micro-wave transmission to military needs.

He made two radio addresses to the American people, giving Italy's side of the war. He spoke English well. The British Broadcasting Corporation denied permission to do likewise in England, but several English newspapers published his proposed speech in full.

Marconi received honors and decorations too numerous to give in full from many governments, universities and scientific institutions. In 1909 he shared the Nobel Prize in physics with Professor Braun. He became an Italian Senator in 1904 and an Italian Marquis in 1929.

Induced Pope to Broadcast

He installed a radio station at the Vatican in 1931 and induced Pope Pius XI to become the first Pope to speak over the radio.

He was married twice. His first wife was the Hon. Beatrice O'Brien, daughter of Lord Inchiquin. They were married in London in 1905 and had three children. They were divorced in Fiume in 1924 and the marriage was annulled by the Vatican Court in 1927. Marconi was remarried in 1927 to the Countess Maria Cristina Bezzi-Scali, member of an old Roman family. A daughter, Elettra, was born in 1930.

For several years Marconi had impressed his intimates as being a tired man. "When will I ever get some leisure?" he ended nearly all his letters. The demands on his time were tremendous, and he kept working until the end. He suffered his first heart attack, so far as known, in 1935 and had been ill several times since then.

Science's Aid to Warfare Had Worried Marconi

LONDON, July 20 (AP).—George Lansbury, veteran British Labor leader, disclosed today Guglielmo Marconi, inventor of the wireless, who died at Rome today, had told him in an interview ten days ago he was deeply worried because "the world's scientific genius was being used to create weapons of destruction."

The British Member of Parliament, who went to Rome to see Premier Mussolini in the interest of a world peace movement, said Marconi was perturbed over strained relations between Italy and Great Britain.

"He thought it terrible that Italians should ever be considered as enemies by the British," Mr. Lansbury said. "Marconi also thought it a terrible thing that the inventive and scientific genius of the world was being used for purposes of destruction which might ultimately result in modern inventions destroying all we take pride in as our inheritance from the past."